

# New technology helps old buoys shine

## ■ Coast Guard replacing incandescent bulbs on marine navigation aids with LED systems that last longer and are less likely to be damaged or stolen

BY BILL BLEYER  
bill.bleyer@newsday.com

Just before 9 a.m. last Thursday, the 225-foot Coast Guard cutter Juniper edged alongside Buoy 32A marking a shallow rocky area in Long Island Sound off Bayville.

Two crew members used long boathooks to snag the 26-foot-tall navigation aid bobbing in gentle seas. They wrestled it against the black hull, its bell ringing rapidly as if it were annoyed at being disturbed.

It had been three years since the 6-ton buoy had been pulled from the Sound for routine maintenance. But this overhaul was hardly routine. As part of a nationwide Coast Guard effort to modernize 5,400 buoys, the Juniper's crew replaced the buoy's old lighting system with a small lantern consisting of a single LED light and smaller batteries surrounded by five small solar panels.

The light-emitting diode technology is cheaper, lasts longer, re-

quires less maintenance and is less subject to damage than incandescent bulbs, the Coast Guard says. It represents the biggest shift in buoy technology since solar panels were introduced to charge the batteries in 1983.

Juniper, based in Newport, R.I., is replacing 18 buoys around Long Island, among the 141 its crew is fixing from Cape Cod to Tom's River, N.J. Hundreds of buoys, mostly maintained by the Coast Guard, local municipalities and some private entities, dot Long Island Sound and other waterways around Long Island. They guide the more than 100,000 pleasure craft registered in Nassau and Suffolk, as well as tankers and cargo ships. They are the road signs on the water, marking channels and unseen obstructions.

The Juniper maintains the big buoys. Two smaller buoy tenders share Juniper's territory and maintain bay and river buoys, which are also getting the LED systems.

"With the LED, everything is

all in one unit," explained Lt. Cmdr. Rick Wester, the Juniper's 36-year-old captain. "So if there is a problem, a small boat can go out, unscrew it and just replace it with a new one."

But it is the added reliability that is the biggest advantage of the LED lights made by a Cana-

dian firm, Carmanah Technologies Corp. The old lighting system and particularly the solar panels were exposed to damage from weather and passing vessels.

"We had the April 16th storm that came through and we had eight of our buoys in this area

with everything stripped off of them," Wester said.

"Most of our buoys have a bell or gong that in rough seas cause a lot of vibration," Wester also said. Those vibrations can wreak havoc with the old buoys' bulbs, which were set in a ring and designed to rotate and

change automatically when one light burned out; the vibrations caused the ring to rotate even if the bulbs weren't burned out, so many buoys went dark prematurely.

While the LEDs produce a red or green light, the incandescent bulbs were white.

"To make a green or red you have to add a colored lens and then you lose 70 percent of the [illumination] power," Wester said. "To make up for that loss of power you have larger batteries."

Because the old larger solar panels were mounted on frames above the lantern, they were ex-

posed and easily damaged or stolen because they could be used for other applications, Wester said. "Fishing boats go by with their outriggers and they'll knock them right off. And there is an area for a bird to build a nest and poop on it. If 10 percent of the panel is covered, the bat-

tery will die eventually," he said.

And theft should not be a problem because these new solar panels cannot operate independently of the lens.

Larry Jaeger, an engineer in the Coast Guard Ocean Engineering Division in Washington, said the LEDs are cheaper, from \$1,250 to \$1,900 compared with about \$1,400 to about \$2,400 for the old units. And they last for 278 months compared with six to 12 months for a bulb.

Robert Andresen, vice president of the Captree Boatmen's and Captains' Association and a former member of the Coast Guard, said the new lights seem to work fine. "They look the same to us," he said. "And if there is less maintenance, that's great because they have a lot of work to do."

The Juniper crew spends 70 percent of its hours servicing buoys. Because the changeover will reduce that to 50 percent, Juniper's crew will have more time for law enforcement work, Wester said.

But the Juniper's crew spent all of Thursday maintaining three buoys in the Sound. Out at 32A, the crew attached a series of control lines and winch cables before Bosun Michael Tomasi pointed skyward and shouted "Up!" Seaman Juan Reyes moved the controls on a 40,000-pound-capacity crane and the red buoy emerged free of the water, a long beard of seaweed dangling from its sides.

The buoy was winched across the deck and chained in place. Petty Officer James Caraglin unbolted the hatch with a pneumatic wrench to retrieve the battery. Senior Chief Kathleen McSweeney climbed to the top of the frame and installed the LED unit with four bolts. Seaman Apprentice Melissa Murch and Seaman Apprentice Peter Hardy used spades to scrape off barnacles and seaweed.

Two and a half hours after the project began, Tomasi had the buoy's 8,500-pound sinker lowered over the side and announced "Ready to throw the rock down." The crane lifted 32A, dangling it over the side for a few moments as an automatic positioning system kept the 2,000-ton ship within inches of the buoy's designated location on the nautical charts.

"Put it down," Tomasi said.

The buoy settled into place, its bell once again clanging. The Juniper then steamed east.

### Understanding the system

Buoys are the traffic signals of the seas, with colors and shapes that indicate different things to mariners.

#### GREEN

Identify edge of a channel on port (left) side as a boater enters from the open sea. Marked by odd numbers that increase as he or she continues upstream.



#### GREEN AND RED TOGETHER

Identify the junction of two channels and the preferred channel for boaters. If green is on top, the preferred channel is to the right. If red is on top, the preferred channel is to the left.



#### RED

Identify edge of a channel on starboard (right) side as a boater enters from the open sea. Marked by even numbers that increase as he or she continues upstream.



#### YELLOW

Indicate need for caution, including but not limited to, issues such as dredging, fish trap areas and military exercises.



## The transformation

Here's how the Juniper services a large buoy.

### About the Juniper

- **Purpose:** Seagoing buoy tender
- **Home port:** Newport, R.I.
- **Crew:** 8 officers, 40 enlisted
- **Length:** 225 feet
- **Propulsion:** 2 diesel engines capable of delivering 6,200 hp
- **Maximum speed:** 15 knots
- **Range:** 6,900 miles
- **Displacement:** 2,000 tons
- **History:** Commissioned in 1996, the Juniper took part in the TWA Flight 800 recovery in July of that year. It also took part in Egypt Air Flight 990 recovery in 1999 and anti-terrorist operations after the Sept. 11, 2001 attacks.



1  
Juniper pulls alongside a buoy, some weighing as much as six tons.



2  
Crane drags buoy onto the deck.



3  
Chain is disconnected between the buoy and its anchor. Buoy is swept clean of debris.



4  
Cable that connects the light to the batteries is disconnected. Lighting equipment is unscrewed and new LED lantern is installed.



5  
Buoy is re-anchored in its former location.

## New-age beacons

The Coast Guard cutter Juniper is modernizing more than 100 buoys in Long Island Sound and vicinity with new light-emitting diodes (LED) that are said to be more efficient and less costly.

### Traditional buoy

- Twelve-volt solar panels are mounted above the lantern.
- Solar panels provide charge to batteries inside the buoy through an external wire.
- Another set of wires connect to an incandescent bulb inside the buoy lens.
- Bulb produces a white, filament light that must be covered to produce color of light desired.

### LED buoy

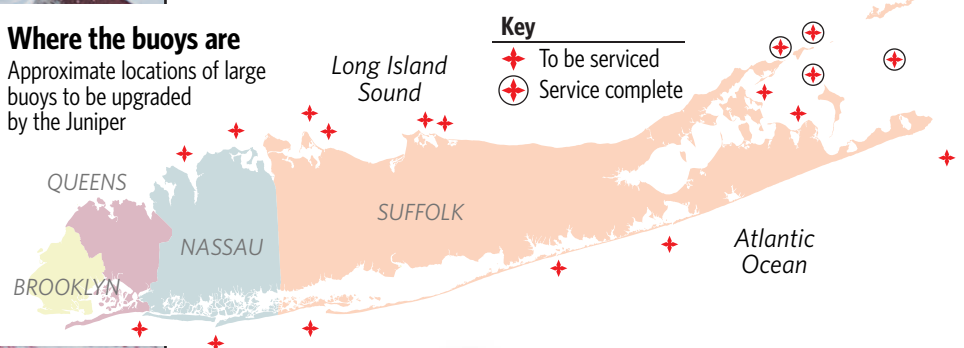
- Solar panels are located on each of five sides of LED housing.
- Small batteries are located inside the housing and are charged by the solar panels via an internal connection.
- Batteries provide current that fires up LEDs.
- LEDs can be manufactured to produce desired color.

### Advantages

- Filaments in traditional buoys tend to break on open seas. LED buoys do not use filaments.
- Five-year battery replacement is, in most cases, extent of maintenance.

### Where the buoys are

Approximate locations of large buoys to be upgraded by the Juniper



#### Key

- ✕ To be serviced
- Service complete